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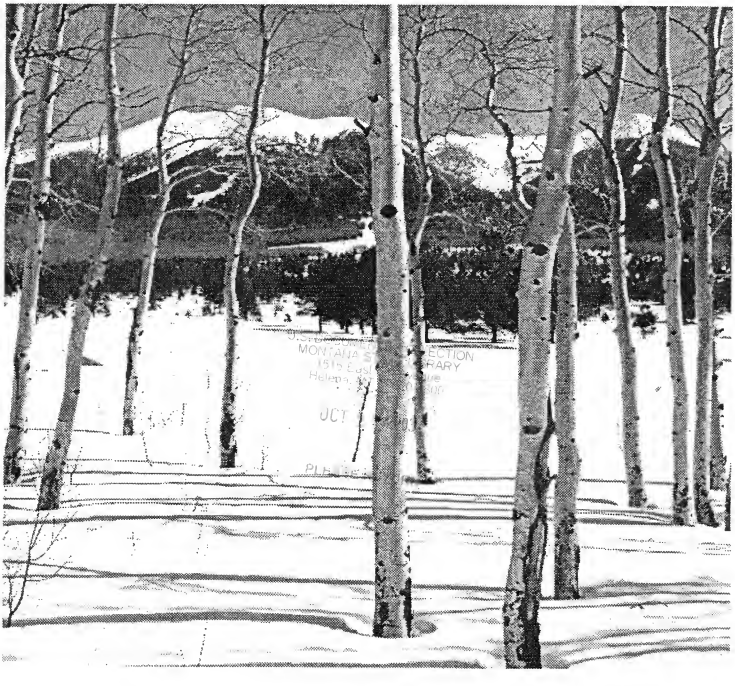
United States Department of Agriculture

Soil Conservation Service

Montana Basin Outlook Report April 1, 1993



MONTANA
LIBRARY
UCT

***** IMPORTANT NOTICE TO ALL SNOTEL USERS *****

Montana State Library
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The SNOTEL data collection system is entering the final phase of an extensive upgrade which began in 1987. This activity will culminate this spring and summer with the replacement of the two master stations and the Portland central computer, and the upgrade of all remote site transceivers. Beginning the week of May 10th, the Boise master station will be shut down and retrofitted, leaving the Ogden master station to carry the system load through part of the summer. No more than a two to three percent drop in site reporting response is expected, and the entire process should be nearly transparent to most SNOTEL data users. By the end of the summer of 1993, both master stations, the Portland central computer, and all remote sites will be replaced or upgraded. The benefits of this activity include improved equipment reliability, additional sensor capability, and improved system flexibility. For more information, please contact your local Soil Conservation Service Snow Survey office.

***** IMPORTANT NOTICE FOR SNOTEL USERS *****

MONTANA Water Supply Outlook Report as of April 1, 1993

Montana did not receive the heavy snow during March as hoped. The storms that did occur, added little to our snow-short mountains. It appears now that the mountain snowpack we have, will not be enough to ensure adequate surface water supplies over much of the state and many areas will need above average spring rain to ensure adequate water supplies.

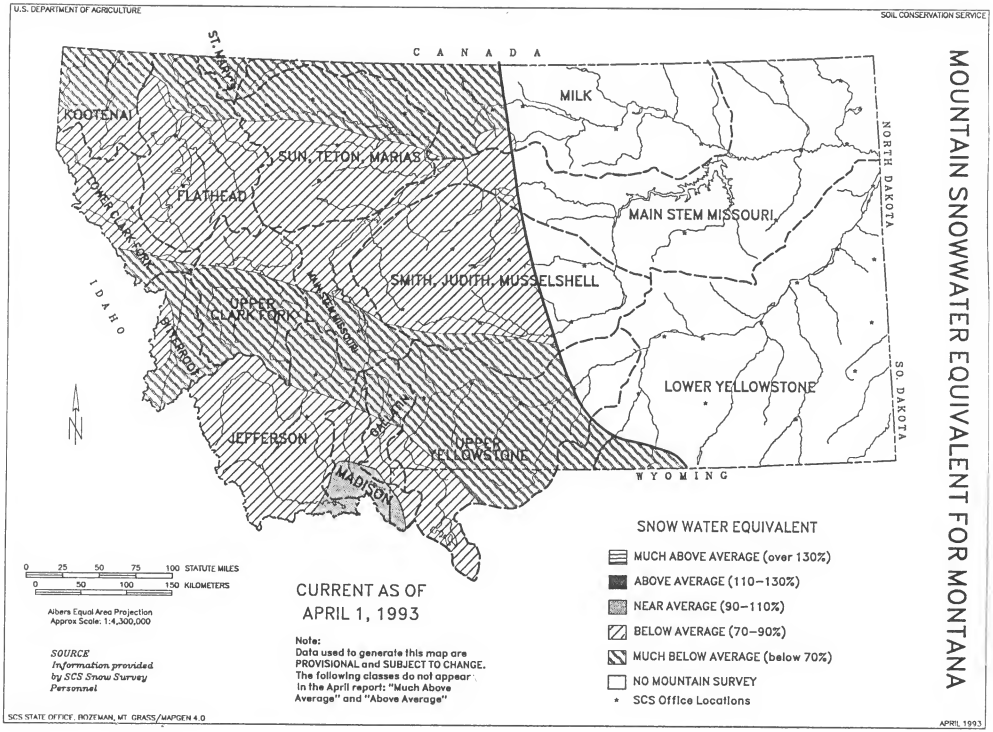
SNOWPACK

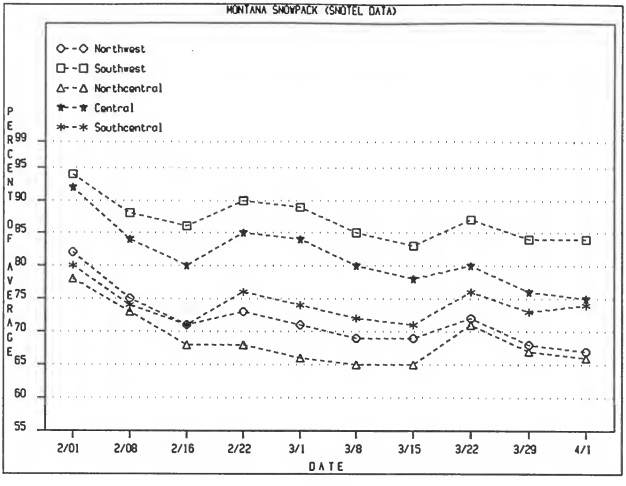
April 1 snow surveys show snowpack percents of average have decreased in every major river basin from one month ago. The greatest decrease in percent of average was in the Madison River Basin dropping 15 percent from March 1 with the least decrease in the Sun-Teton-Marias River Basins dropping 1 percent from March 1.

The lowest April 1 snowpack measurements occurred in the Tobacco River Watershed (Kootenai River Basin) at 59 percent of average and the highest occurred in the Upper Madison River Watershed (Madison River Basin) at 93 percent of average.

West of the Continental Divide, snowpacks are below to well below average and are about the same as those of last year. East of the Continental Divide snowpacks are also below to well below average and about the same as those of last year, except in the Madison, Gallatin, Mainstem Missouri and Smith-Judith-Musselshell River Basins where they are above those of last year.

RIVER BASIN	% OF AVERAGE	% OF LAST YEAR
KOOTENAI	69	111
FLATHEAD	72	105
UPPER CLARK FORK	65	97
BITTERROOT	67	111
LOWER CLARK FORK	71	106
JEFFERSON	75	96
MADISON	89	121
GALLATIN	77	110
MAINSTEM MISSOURI	71	111
SMITH-JUDITH-MUSSELSHELL	73	126
SUN-TETON-MARIAS	70	99
ST. MARY AND MILK	65	107
UPPER YELLOWSTONE	69	100
LOWER YELLOWSTONE	73	93
YELLOWSTONE	71	96


U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
MOUNTAIN SNOWWATER EQUIVALENT FOR MONTANA
CANADA
ST. MARY'S
KOOTENAI
SUN, TETON, MARIAS
MILK
NORTH DAKOTA
FLATHEAD
MAIN STEM MISSOURI
LOWER CLARK FORK
IDAHO
SMITH, JUDITH, MUSSELSHELL
UPPER CLARK FORK
MINNESKAHTA
MISSOURI
BITTERROOT
SO. DAKOTA
LOWER YELLOWSTONE
JEFFERSON
GALLATIN
UPPER YELLOWSTONE
MADISON
WYOMING
BIG HORN
SNOW WATER EQUIVALENT
MUCH ABOVE AVERAGE (over 130%)
ABOVE AVERAGE (110–130%)
NEAR AVERAGE (90–110%)
BELOW AVERAGE (70–90%)
MUCH BELOW AVERAGE (below 70%)
NO MOUNTAIN SURVEY
SCS Office Locations
0 25 50 75 100 STATUTE MILES
0 50 100 150 KILOMETERS
Albers Equal Area Projection
Approx Scale: 1:4,300,000
SOURCE
Information provided by SCS Snow Survey Personnel
CURRENT AS OF APRIL 1, 1993
Note:
Data used to generate this map are PROVISIONAL and SUBJECT TO CHANGE. The following classes do not appear in the April report: "Much Above Average" and "Above Average"
SCS STATE OFFICE, BOZEMAN, MT GRASS/MAPGEN 4.0
APRIL 1993


MONTANA SNOWPACK (SNOTEL DATA)
Northwest
Southwest
Northcentral
Central
Southcentral
PERCENT OF AVERAGE
99
95
90
85
80
75
70
65
60
55
2/01
2/08
2/16
2/22
3/1
3/8
3/15
3/22
3/29
4/1
DATE

PRECIPITATION

March mountain precipitation west of the Continental Divide was well below average, except in the Bitterroot where they were average. East of the Continental Divide March ranged from well below to near average. Water year precipitation west of the Continental Divide remains below average and east of the Continental Divide ranges from below average to near average.

RIVER BASIN	MARCH % OF AVERAGE	WATER YEAR % OF AVERAGE
KOOTENAI	62	72
FLATHEAD	69	76
UPPER CLARK FORK	67	78
BITTERROOT	96	76
LOWER CLARK FORK	69	71
JEFFERSON	80	85
MADISON	66	97
GALLATIN	77	87
MAINSTEM MISSOURI	57	81
SMITH-JUDITH-MUSSELSHELL	66	90
SUN-TETON-MARIAS	93	78
ST. MARY AND MILK	96	82
UPPER YELLOWSTONE	76	80
LOWER YELLOWSTONE	70	81

RESERVOIRS

Reservoir storages remain well below average in the Flathead River, Bitterroot River, Jefferson River, Gallatin River and Kootenai River Basins; average in the Upper Clark Fork River, Mainstem Missouri River, Madison River, Upper Yellowstone River, and Lower Yellowstone River Basins; above average in the Smith-Judith-Musselshell River and Sun-Teton-Marias River Basins; and well above average in the Lower Clark Fork.

RIVER BASIN	% OF CAPACITY	% OF AVERAGE
KOOTENAI	24	65
FLATHEAD	26	49
UPPER CLARK FORK	68	96
BITTERROOT	14	31
LOWER CLARK FORK	96	140
JEFFERSON	34	59
MADISON	72	107
GALLATIN	24	59
MAINSTEM MISSOURI	74	99
SMITH-JUDITH-MUSSELSHELL	77	121
SUN-TETON-MARIAS	53	112
ST. MARY AND MILK	49	91
UPPER YELLOWSTONE	44	107
LOWER YELLOWSTONE	58	100

STREAMFLOW

Provisional March streamflow data west of the Continental Divide were generally below to well below average and those east of the Continental Divide are generally below to near average.

Assuming current conditions persist, seasonal volume streamflows are forecast to be well below average, except in the Stillwater, Swan, Upper Madison, Upper Gallatin and Upper Yellowstone Rivers where forecasts are for below average volumes.

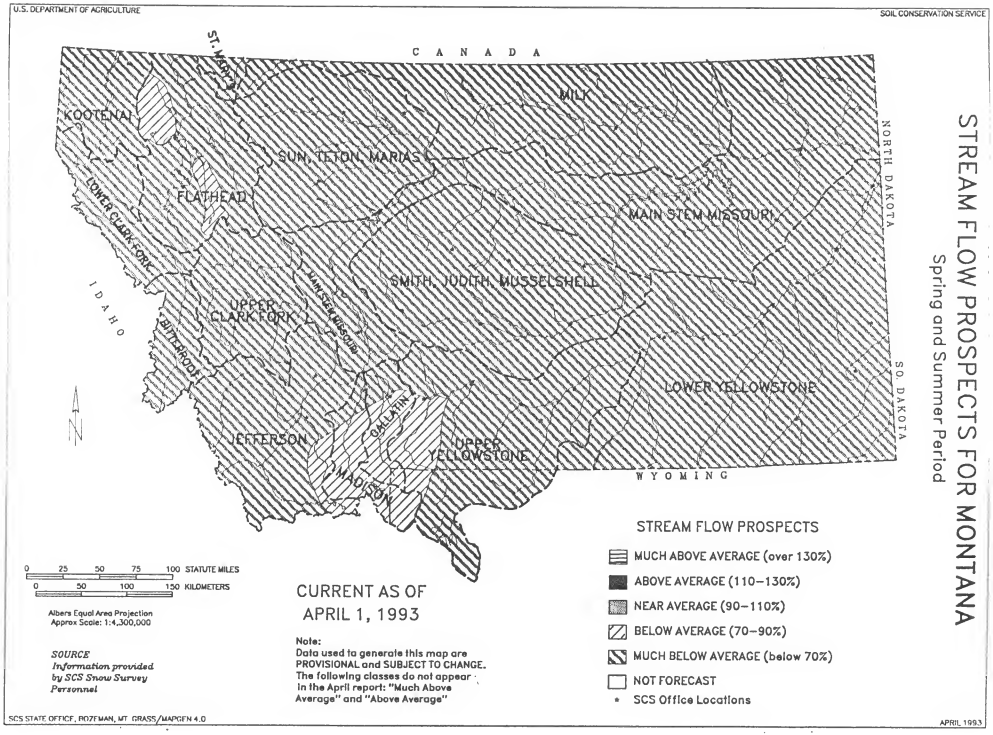
Streamflow peaks are estimated to be 2 to 4 weeks ahead of average. Streamflow peaks in the Columbia River Basin are estimated to occur during late April to mid May; the Missouri River Basin from the middle of May to the latter part of May; and the Yellowstone River Basin from the latter part of May to the first of June.

NOTE: The "FORECASTS % OF LAST YEAR" column in the table that follows, is comparing this seasons forecast volumes with the forecast volumes of last year at this same time. It is not comparing this years forecast volumes with what actually occurred last year.

RIVER BASIN	FORECASTS % OF AVERAGE	FORECASTS % OF LAST YEAR
KOOTENAI	73	94
FLATHEAD	68	92
UPPER CLARK FORK	46	76
BITTERROOT	57	92
LOWER CLARK FORK	61	97
JEFFERSON	51	73
MADISON	85	102
GALLATIN	75	105
MAINSTEM MISSOURI	62	86
SMITH-JUDITH-MUSSELSHELL	64	128
SUN-TETON-MARIAS	56	79
ST. MARY AND MILK	70	88
UPPER YELLOWSTONE	76	101
LOWER YELLOWSTONE	73	99

SOIL MOISTURE

Fall precipitation and winter streamflows indicated soil moisture conditions in the Kootenai River, Lower Clark Fork River, Bitterroot River and Jefferson River Basins were well below average with all other basins slightly below to near average. Above average low elevation snowpacks and some valley rain have helped the surface soil deficits, but it is unlikely it has been enough to overcome severe deficits.


U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
STREAM FLOW PROSPECTS FOR MONTANA
Spring and Summer Period
CANADA
ST. MARY
MILK
KOOTENAI
SUN, TETON, MARIAS
FLATHEAD
LOWER CLARK FORK
MAIN STEM MISSOURI
NORTH DAKOTA
SMITH, JUDITH, MUSSELSHELL
UPPER CLARK FORK
MIDDLE MISSOURI
BITTERROOT
IDAHO
LOWER YELLOWSTONE
SO. DAKOTA
GALLATIN
JEFFERSON
UPPER YELLOWSTONE
MADISON
WYOMING
0 25 50 75 100 STATUTE MILES
0 50 100 150 KILOMETERS
Albers Equal Area Projection
Approx Scale: 1:4,300,000
SOURCE
Information provided by SCS Snow Survey Personnel
CURRENT AS OF APRIL 1, 1993
Note:
Data used to generate this map are PROVISIONAL and SUBJECT TO CHANGE. The following classes do not appear in the April report: "Much Above Average" and "Above Average"
STREAM FLOW PROSPECTS
MUCH ABOVE AVERAGE (over 130%)
ABOVE AVERAGE (110–130%)
NEAR AVERAGE (90–110%)
BELOW AVERAGE (70–90%)
MUCH BELOW AVERAGE (below 70%)
NOT FORECAST
SCS Office Locations
SCS STATE OFFICE, BOZEMAN, MT GRASS/MAPGEN 4.0
APRIL 1993

SURFACE WATER SUPPLY INDEX

The Surface Water Supply Index (SWSI) is a measure of available surface water supplies during the spring and summer months. The index ranges from -4.0 to +4.0. A SWSI of -4.0 represents an extremely dry condition, 0 is a near normal condition and +4.0 represents an extremely wet condition. The SWSI provides a scale to evaluate various levels of wetness or dryness and water supply conditions across the state. The SWSI takes into account snowpack, mountain precipitation, soil moisture and available reservoir storage.

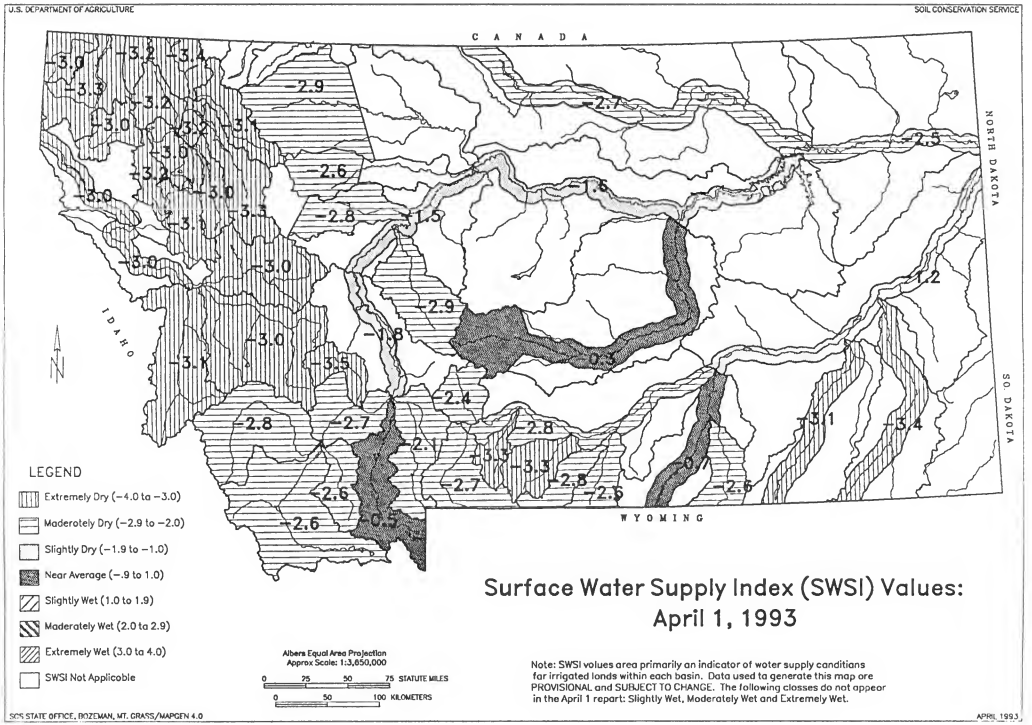
SWSI RATING	SURFACE WATER CONDITION
+3.0 to +4.0	Extremely Wet
+2.0 to +3.0	Moderately Wet
+1.0 to +2.0	Slightly Wet
-1.0 to +1.0	Near Average
-1.0 to -2.0	Slightly Dry
-2.0 to -3.0	Moderately Dry
-3.0 to -4.0	Extremely Dry

SWSI's as of April 1, 1993 for the remainder of the 1993 irrigation season.

SWSI Rating	Basin
-3.4	Kootenai River at Ft. Steele (Kootenai in Canada)
-3.2	Tobacco River
-3.2	Kootenai Ft. Steele to Libby Dam
-3.3	Kootenai River below Libby Dam
-3.0	Fisher River
-3.0	Yaak River
-3.4	North Fork Flathead River
-3.1	Middle FORK Flathead River
-3.3	South Fork Flathead River
-3.2	Flathead River at Columbia Falls
-3.2	Stillwater/Whitefish Rivers
-3.0	Swan River
-3.0	Flathead River at Polson
-3.1	Mission Valley
-3.2	Little Bitterroot River
-3.3	Clark Fork River above Rock Creek
-2.7	Blackfoot River
-3.1	Bitterroot River
-3.0	Clark Fork River above Missoula
-3.0	Clark Fork River below Bitterroot River
-3.0	Clark Fork River below Flathead River
-2.6	Beaverhead River
-2.6	Ruby River
-2.8	Big Hole River
-3.5	Boulder River (Jefferson)
-2.7	Jefferson River
-0.5	Madison River
-2.1	Gallatin River
-1.8	Missouri River above Canyon Ferry
-1.5	Missouri River below Canyon Ferry
-2.9	Smith River
-2.8	Sun River
-2.6	Teton River
-3.1	Birch/Dupuyer Creeks
-2.9	Marias River
-0.3	Musselshell River

SWSI's as of April 1, 1993 for the remainder of the 1993 irrigation season.

SWSI Rating	Basin
-1.6	Missouri River above Ft. Peck
-2.5	Missouri River below Ft. Peck
-2.7	Milk River (USBR users)
-2.9	Milk River (other users)
-2.7	Yellowstone River above Livingston
-2.4	Shields River
-3.3	Boulder River (Yellowstone)
-3.3	Stillwater River
-2.8	Rock/Red Lodge Creeks
-2.6	Clarks Fork River
-2.8	Yellowstone River above Bighorn River
-0.7	Bighorn River below Bighorn Lake
-2.6	Little Bighorn River
-1.2	Yellowstone River below Bighorn River
-3.1	Tongue River
-3.4	Powder River



Surface Water Supply Index (SWSI) Values: April 1, 1993

Note: SWSI values area primarily an indicator of water supply conditions for irrigated lands within each basin. Data used to generate this map are PROVISIONAL and SUBJECT TO CHANGE. The following classes do not appear in the April 1 report: Slightly Wet, Moderately Wet and Extremely Wet.

KOOTENAI RIVER BASIN in Montana as of April 1, 1993

Snowpack conditions in the Kootenai River Basin slipped 4 percent during March and are well below average fut 11 percent above last year. On April 1 the snow water content was 69 percent of average and 111 percent of last year. Refer to the watershed snowpack analysis that follows for individual watershed percent of average and percent of last year figures.

Mountain precipitation for March was again well below average at 62 percent but was more than twice of last March. Water year precipitation, beginning October 1, 1992, once again slipped and is now 72 percent of average and nearly the same as last year.

Lake Koocanusa storage on the last day of March was 65 percent of average and 40 percent below last year.

Streamflows are forecast to be below average at 73 percent and 6 percent below those of last year. Provisional March streamflow data at the Fisher River near Libby was about 66 percent of average and 24 percent below last year; the Yaak River near Troy was about 72 percent of average and 39 percent below last year; and the Kootenai below Libby Dam was about 103 percent of average and 8 percent below last year.

Surface Water Supply Index (SWSI) rating for the Kootenai River at Ft. Steele (Kootenai in Canada) was -3.4; the Tobacco River was -3.2; the Kootenai Ft. Steele to Libby Dam was -3.2; the Kootenai River below Libby Dam was -3.3; the Fisher River was -3.0; and the Yaak River was -3.0.

KOOTENAI RIVER BASIN in Montana
Streamflow Forecasts - April 1, 1993

	<--- Drier ---	Future Conditions	--- Wetter --->			
Forecast Pt	Chance of Exceeding *					
Forecast Period	90% (1000AF)	70% (1000AF)	50% (Most Prob) (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)	30 Yr Avg (1000AF)
TOBACCO nr Eureka							
APR-JUL	47	60	69	52	78	91	133
APR-SEP	54	70	80	54	91	106	147
KOOTENAI bl Libby Dam (1,2)							
APR-JUL	2860	3620	3970	69	4320	5080	5779
APR-SEP	3350	4240	4650	69	5060	5950	6772
FISHER nr Libby							
APR-JUL	124	143	155	66	168	186	234
APR-SEP	137	155	168	67	181	199	250
YAAK nr Troy							
APR-JUL	225	270	300	62	330	375	483
APR-SEP	245	290	320	63	350	395	505

Forecast Pt / Forecast Period	<--- Drier --- 90% (1000AF)	70% (1000AF)	Future Conditions — Chance of Exceeding * — 50% (Most Prob) (1000AF)	(% AVG.)	--- Wetter ---> 30% (1000AF)	10% (1000AF)	30 Yr Avg (1000AF)
KOOTENAI at Leonia (1,2)							
APR-JUL	3460	4400	4830	67	5260	6200	7199
APR-SEP	3970	5060	5550	67	6040	7130	8275

* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

(1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
(2) - The value is natural flow - actual flow may be affected by upstream water management.

KOOTENAI RIVER BASIN in Montana
Reservoir Storage (1000AF) End of March

Reservoir	Usable Capacity	********** Usable Storage ********** This Year	Last Year	Average
LAKE KOOCANUSA	5748.0	1402.0	2333.0	2141.0

KOOTENAI RIVER BASIN in Montana
Watershed Snowpack Analysis - April 1, 1993

Watershed	Number of Data Sites	This Year as Percent of Last Year	Average
EAST KOOTENAI in B.C.	28	83	61
KOOTENAI MAINTSTEM in MT	20	111	69
TOBACCO	3	84	60
FISHER	4	108	71
YAAK	7	102	69
KOOTENAI in MT	20	111	69
KOOTENAI ab Bonners Ferry	48	97	65

FLATHEAD RIVER BASIN as of April 1, 1993

Snowpack conditions in the Flathead River Basin are below average and dropped 6 percent from one month ago but are 5 percent above last year. Snow water content was 72 percent of average and 105 percent of last year. Refer to the watershed snowpack analysis that follows for individual watershed percent of average and percent of last year figures.

Mountain precipitation during March was well below average at 69 percent, but nearly twice that of last March. Water year precipitation, beginning October 1, 1992, is below average at 76 percent and nearly the same as last year at this time.

Reservoir storage on the last day of March was 49 percent of average. Combined Camas reservoir storage was 79 percent of average; the combined Mission Valley reservoir storage was 70 percent of average; Hungry Horse storage was 34 percent of average and 66 percent below last year; and Flathead Lake storage was 85 percent of average and 9 percent above last year.

Streamflows are forecast to be well below average at 68 percent and 8 percent below those of last year. Provisional March streamflow data for the North Fork Flathead near Columbia Falls was about 80 percent of average and generally 30 percent below last year and the South Fork Flathead near Columbia Falls was about 110 percent of average and 20 percent below last year.

Surface Water Supply Index (SWSI) rating for the North Fork Flathead River was -3.4; the Middle Fork Flathead River was -3.1; the South Fork Flathead River was -3.3; the Flathead River at Columbia Falls was -3.2; the Stillwater/Whitefish Rivers were -3.2; the Swan River was -3.0; the Flathead River at Polson was -3.0; Mission Valley was -3.1; and the Little Bitterroot River was -3.2.

FLATHEAD RIVER BASIN
Streamflow Forecasts - April 1, 1993

	<=== Drier ===	Future Conditions	=== Wetter ===>			
Forecast Pt	========== Chance of Exceeding * ==========					
Forecast Period	90% (1000AF)	70% (1000AF)	50% (Most Prob) (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)	30 Yr Avg (1000AF)
NF FLATHEAD nr Columbia Falls							
APR-JUL	910	1020	1090	66	1160	1270	1662
APR-SEP	1010	1130	1210	66	1290	1410	1836
MF FLATHEAD nr West Glacier							
APR-JUL	915	1040	1130	69	1220	1350	1638
APR-SEP	995	1130	1230	69	1330	1470	1788
SF FLATHEAD nr Columbia Fls (1,2)							
APR-JUL	1130	1340	1430	70	1520	1730	2051
APR-SEP	1200	1430	1530	70	1630	1860	2184
FLATHEAD at Columbia Falls (2)							
APR-JUL	3210	3540	3760	69	3980	4310	5482
APR-SEP	3460	3830	4080	68	4330	4700	5960
STILLWATER nr Whitefish							
APR-JUL	120	132	140	74	148	160	189
APR-SEP	132	146	156	75	166	180	209

Forecast Pt Forecast Period	<=== Drier === Future Conditions === Wetter ===> Chance of Exceeding * 90% (1000AF)	70% (1000AF)	50% (Most Prob) (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)	30 Yr Avg (1000AF)
WHITEFISH nr Kalispell							
APR-JUL	62	71	78	75	85	95	104
APR-SEP	71	81	88	76	95	105	116
SWAN nr Bigfork							
APR-JUL	375	415	445	76	475	515	583
APR-SEP	420	470	505	76	540	590	665
FLATHEAD nr Polson (1,2)							
APR-JUL	3210	3880	4190	66	4500	5170	6390
APR-SEP	3540	4320	4670	67	5020	5800	6926

* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

(1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
(2) - The value is natural flow - actual flow may be affected by upstream water management.

FLATHEAD RIVER BASIN
Reservoir Storage (1000AF) End of March

Reservoir	Usable Capacity	********* Usable Storage ********* This Year	Last Year	Average
CAMAS (4)	45.2	18.7	33.8	23.7
MISSION VALLEY (8)	100.0	28.7	28.6	40.9
HUNGRY HORSE	3451.0	699.0	1951.0	2046.0
FLATHEAD LAKE	1791.0	642.0	587.7	751.9

FLATHEAD RIVER BASIN
Watershed Snowpack Analysis - April 1, 1993

Watershed	Number of Data Sites	This Year as Percent of Last Year	Average
NORTH FORK FLATHEAD	12	100	68
MIDDLE FORK FLATHEAD	9	96	67
SOUTH FORK FLATHEAD	10	106	77
STILLWATER-WHITEFISH	5	112	75
SWAN	10	102	76
MISSION VALLEY	5	101	73
LITTLE BITTERROOT-ASHLEY	7	139	73
JOCKO	5	97	73
FLATHEAD	44	104	72

UPPER CLARK FORK RIVER BASIN as of April 1, 1993

Snowpack conditions in the Upper Clark Fork River Basin are well below average dropping 9 percent from last month and 3 percent below last year. Snow water content was 65 percent of average and 97 percent of last year. Refer to the watershed snowpack analysis that follows for individual watershed percent of average and percent of last year figures.

Mountain precipitation for March was once again well below average at 67 percent but 30 percent higher than last March. Water year precipitation, beginning October 1, 1992, remains below average at 78 percent and nearly the same as last year.

Reservoir storage on the last day of March was 96 percent of average. Georgetown Lake storage was 102 percent of average and 8 percent below last year; Lower Willow Creek storage was 104 percent of average and the same as last year; and Nevada Creek storage was 71 percent of average.

Streamflows are forecast to be well below average at 46 percent and 24 percent below last year. Provisional March inflow data at Moulton Reservoir was about 25 percent of average; Flint Creek near Southern Cross was about 50 percent of average; Rock Creek near Clinton was about 80 percent of average and about 10 percent below last year; and the Clark Fork River above Missoula was about 80 percent of average and near those of last year.

Surface Water Supply Index (SWSI) rating for the Clark Fork River above Rock Creek was -3.3; the Blackfoot River was -3.0; and the Clark Fork River above Missoula was -3.0.

UPPER CLARK FORK RIVER BASIN
Streamflow Forecasts - April 1, 1993

Forecast Pt Forecast Period	<=== Drier === Future Conditions === Wetter ===> Chance of Exceeding * 90% (1000AF)	70% (1000AF)	50% (Most Prob) (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)	30 Yr Avg (1000AF)
MOULTON RES inflow (million gal.)							
APR-JUN	53	66	88	42	117	158	212
APR-JUL	61	75	94	40	127	175	234
WARM SPRINGS CK at Anaconda (2)							
APR-JUL	13.0	17.0	21	55	25	32	38
APR-SEP	20	24	28	60	33	41	47
LITTLE BLACKFOOT nr Garrison							
APR-JUL	18.0	25	32	39	51	79	83
APR-SEP	20	28	36	40	57	87	89
FLINT CK nr Southern Cross (2)							
APR-JUL	3.0	4.0	5.1	36	7.2	10.3	14.2
APR-SEP	4.0	5.0	5.5	33	8.2	12.1	16.7
FLINT CK bl Boulder Ck							
APR-JUL	22	26	29	51	37	48	57
APR-SEP	29	34	40	55	49	63	73
LOWER WILLOW CK RES inflow							
APR-JUL	2.9	4.7	7.0	50	9.3	12.7	14.0
APR-SEP	3.0	5.0	7.4	50	9.8	13.3	14.8

Forecast Pt / Forecast Period	<--- Drier --- 90% (1000AF)	70% (1000AF)	Future Conditions — Chance of Exceeding * — 50% (Most Prob) (1000AF) (% AVG.)	30% (1000AF)	--- Wetter ---> 10% (1000AF)	30 Yr Avg (1000AF)
MF ROCK CK nr Philipsburg						
APR-JUL	26	29	32 48	37	45	66
APR-SEP	30	34	39 53	45	53	74
ROCK CK nr Clinton						
APR-JUL	86	98	110 37	134	169	296
APR-SEP	117	127	140 42	167	205	333
NEVADA CK nr Finn						
APR-JUL	3.1	4.0	5.0 26	8.6	13.8	19.1
APR-SEP	4.0	5.0	6.0 30	10.0	16.0	21
CLEARWATER nr Clearwater						
APR-JUL	95	106	114 66	122	133	172
APR-SEP	102	113	121 67	129	140	181
BLACKFOOT nr Bonner						
APR-JUL	315	395	450 54	505	585	835
APR-SEP	365	455	515 56	575	665	926
CLARK FORK ab Milltown						
APR-JUL	189	210	230 35	320	445	652
APR-SEP	240	270	300 40	400	545	755
CLARK FORK ab Missoula						
APR-JUL	360	550	680 46	810	1000	1487
APR-SEP	455	665	810 48	955	1160	1681

* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

(1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
(2) - The value is natural flow - actual flow may be affected by upstream water management.

UPPER CLARK FORK RIVER BASIN
Reservoir Storage (1000AF) End of March

Reservoir	Usable Capacity	********** Usable Storage ********* This Year	Last Year	Average
GEORGETOWN LAKE	31.0	25.3	27.6	24.8
LOWER WILLOW CREEK	4.9	2.4	2.4	2.3
NEVADA CREEK	12.6	5.2	6.9	7.3

UPPER CLARK FORK RIVER BASIN
Watershed Snowpack Analysis - April 1, 1993

Watershed	Number of Data Sites	This Year as Percent of Last Year	Average
CLARK FORK ab FLINT CREEK	19	94	66
FLINT CREEK	8	96	63
ROCK CREEK	6	97	68
CLARK FORK ab BLACKFOOT	29	96	66
BLACKFOOT	16	98	62
UPPER CLARK FORK	42	96	65

BITTERROOT RIVER BASIN as of April 1, 1993

Snowpack conditions in the Bitterroot River Basin remain below average decreasing 9 percent from March 1 but are 11 percent above last year. Snow water content was 67 percent of average and 111 percent of last year. Refer to the watershed snowpack analysis that follows for individual watershed percent of average and percent of last year figures.

Mountain precipitation for March was near average at 96 percent and nearly two and a half times than of last year. Water year precipitation, beginning October 1, 1992, remains below average at 76 percent and nearly the same as last year.

Reservoir storage on the last day of March was 31 percent of average. Painted Rocks Lake storage was 18 percent of average and 36 percent below last year and Como storage was 43 percent of average (Como Lake was drained to rework the dam).

Streamflows are forecast to be well below average at 57 percent and 8 percent below last year. Provisional March streamflow data for the Bitterroot near Darby was about 80 percent of average and about 10 to 15 percent below last year; Rock Creek Como inflow to Darby was about 45 to 50 percent of average; and the Bitterroot at Missoula was about 90 to 95 percent of average and about 15 to 20 percent of average and about 15 to 20 percent below last year.

Surface Water Supply Index (SWSI) rating for the Bitterroot River was -3.1.

BITTERROOT RIVER BASIN
Streamflow Forecasts - April 1, 1993

	<=== Drier ===	Future Conditions	=== Wetter ===>			
Forecast Pt	========== Chance of Exceeding * ==========					
Forecast Period	90% (1000AF)	70% (1000AF)	50% (Most Prob) (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)	30 Yr Avg (1000AF)
WF BITTERROOT nr Conner (2)							
APR-JUL	53	61	70	46	84	103	152
APR-SEP	63	70	77	46	91	113	166
BITTERROOT nr Darby							
APR-JUL	171	225	265	54	305	360	491
APR-SEP	205	260	300	56	340	395	540
ROCK CK nr Darby (2)							
APR-JUL	42	49	54	68	59	67	79
APR-SEP	45	52	57	69	62	70	83
SKALKAHO CK nr Hamilton							
APR-JUL	21	26	30	65	34	39	46
APR-SEP	26	32	36	68	40	46	53
BURNT FORK CK nr Stevensville (2)							
APR-JUL	12.0	16.0	19.0	66	22	27	29
APR-SEP	14.0	19.0	23	68	27	32	34

Forecast Pt Forecast Period	<=== Drier === 90% (1000AF)	70% (1000AF)	Future Conditions 50% (Most Prob) (1000AF)	(% AVG.)	=== Wetter ==> 30% (1000AF)	10% (1000AF)	30 Yr Avg (1000AF)
	Chance of Exceeding *						
BITTERROOT at Missoula							
APR-JUL	540	660	745	57	830	950	1301
APR-SEP	605	735	825	58	915	1050	1418

* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

(1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
(2) - The value is natural flow - actual flow may be affected by upstream water management.

BITTERROOT RIVER BASIN
Reservoir Storage (1000AF) End of March

Reservoir	Usable Capacity	********** Usable Storage ********* This Year	Last Year	Average
PAINTED ROCKS LAKE	31.7	2.5	3.9	13.6
COMO	34.9	6.6	12.2	15.5

BITTERROOT RIVER BASIN
Watershed Snowpack Analysis - April 1, 1993

Watershed	Number of Data Sites	This Year as Percent of Last Year	Average
WEST FORK BITTERROOT	5	106	64
EAST SIDE BITTERROOT	5	103	64
WEST SIDE BITTERROOT	5	119	71
BITTERROOT	15	111	67

LOWER CLARK FORK RIVER BASIN as of April 1, 1993

Snowpack conditions in the Lower Clark Fork River Basin remain below average decreasing 6 percent from March 1 but were 6 percent above last year. Snow water content was 71 percent of average and 106 percent of last year. Refer to the watershed snowpack analysis that follows for individual watershed percent of average and percent of last year figures.

Mountain precipitation during March was again well below average at 69 percent and was 63 percent above last March. Water year precipitation, beginning October 1, 1992, was below average at 71 percent and 7 percent below last year.

Noxon Rapids storage on the last day of March was 140 percent of average and 1 percent above last year.

Streamflows are forecast to be well below average at 61 percent but 3 percent below last year. Provisional March streamflow data for the Clark Fork River below Missoula was between 85 and 90 percent of average and about 10 percent below last year; the Clark Fork River at St. Regis was about 80 percent of average and 15 to 20 percent below last year.

Surface Water Supply Index (SWSI) rating for the Clark Fork River below Bitterroot River was -3.0 and the Clark Fork River below Flathead River was -3.0.

LOWER CLARK FORK RIVER BASIN
Streamflow Forecasts - April 1, 1993

	<=== Drier ===	Future Conditions	=== Wetter ===>			
Forecast Pt	Chance of Exceeding *					
Forecast Period	90% (1000AF)	70% (1000AF)	50% (Most Prob) (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)	30 Yr Avg (1000AF)
CLARK FORK ab Missoula							
APR-JUL	360	550	680	46	810	1000	1487
APR-SEP	455	665	810	48	955	1160	1681
CLARK FORK bl Missoula							
APR-JUL	940	1230	1430	51	1630	1920	2788
APR-SEP	1100	1420	1640	53	1860	2180	3099
CLARK FORK at St. Regis (1)							
APR-JUL	1080	1740	2040	55	2340	3000	3686
APR-SEP	1200	1940	2270	55	2600	3340	4095
CLARK FORK nr Plains (1,2)							
APR-JUL	4360	5780	6430	62	7080	8500	10450
APR-SEP	4780	6350	7060	62	7770	9340	11470
THOMPSON RIVER nr Thompson Falls							
APR-JUL	71	98	116	54	134	161	214
APR-SEP	87	116	135	56	154	183	240
PROSPECT CREEK at Thompson Falls							
APR-JUL	49	59	66	54	73	83	123
APR-SEP	55	66	73	55	80	91	132

Forecast Pt Forecast Period	<=== Drier === 90% (1000AF)	70% (1000AF)	Future Conditions 50% (Most Prob) (1000AF)	(% AVG.)	=== Wetter ===> 30% (1000AF)	10% (1000AF)	30 Yr Avg (1000AF)
	Chance of Exceeding *						
CLARK FK at Whitehorse Rpds (1,2)							
APR-JUL	5080	6740	7490	64	8240	9900	11730
APR-SEP	5590	7410	8240	64	9070	10900	12910

* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

(1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
(2) - The value is natural flow - actual flow may be affected by upstream water management.

LOWER CLARK FORK RIVER BASIN
Reservoir Storage (1000AF) End of March

Reservoir	Usable Capacity	********** Usable Storage ********** This Year	Last Year	Average
NOXON RAPIDS	335.0	322.8	320.8	231.3

LOWER CLARK FORK RIVER BASIN
Watershed Snowpack Analysis - April 1, 1993

Watershed	Number of Data Sites	This Year as Percent of Last Year	Average
UPPER CLARK FORK	42	96	65
BITTERROOT	15	111	67
LOWER CLARK FORK	16	106	71
CLARK FORK TOTAL	68	104	67
FLATHEAD	44	104	72
PEND OREILLE	107	104	69

JEFFERSON RIVER BASIN as of April 1, 1993

Snowpack conditions in the Jefferson River Basin remain below average dropping 9 percent from last month and are 4 percent below last year. Snow water content was 75 percent of average and 96 percent of last year. Refer to the watershed snowpack analysis that follows for individual watershed percent of average and percent of last year figures.

Mountain precipitation for March was below average at 80 percent but was 85 percent above last year. Water year precipitation, beginning October 1, 1992, remains below average at 85 percent but was 5 percent above last year.

Reservoir storage on the last day of March was 59 percent of average and 28 percent below last year. Lima storage was 17 percent of average and 57 percent below last year; Clark Canyon storage was 62 percent of average and 28 percent below last year; and Ruby River storage was 95 percent of average and 11 percent below last year.

Streamflows are forecast to be well below average at 51 percent and 27 percent below those of last year. Provisional March streamflow data for the Beaverhead River near Grant was near average and about 15 percent above last year; the Ruby River near Alder was about 70 percent of average and around 25 percent below last year.

Surface Water Supply Index (SWSI) rating for the Jefferson River was -2.7; the Beaverhead River was -2.6; the Ruby River was -1.8; the Big Hole River was -2.8; and the Boulder River was -3.5.

JEFFERSON RIVER BASIN
Streamflow Forecasts - April 1, 1993

	<=== Drier ==- Future Conditions -== Wetter ==>					
Forecast Pt	========== Chance of Exceeding * ==========					
Forecast Period	90% (1000AF)	70% (1000AF)	50% (Most Prob) (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)	30 Yr Avg (1000AF)
RED ROCK RIVER near Monida (2)							
APR-JUL	31	48	60	62	72	89	97
APR-SEP	28	49	63	60	77	98	105
BEAVERHEAD RIVER near GRANT (2)							
APR-JUL	29	64	88	67	112	147	132
APR-SEP	28	71	100	65	129	172	155
BEAVERHEAD RIVER at Barretts (2)							
APR-JUL	60	98	123	72	148	186	172
APR-SEP	70	112	141	69	170	210	203
RUBY RIVER near Alder							
APR-JUL	29	44	54	65	64	79	83
APR-SEP	39	57	69	70	81	99	99
BIG HOLE RIVER near Melrose							
APR-JUL	198	290	355	55	420	510	641
APR-SEP	215	315	385	55	455	555	697
BOULDER RIVER near Boulder							
APR-JUL	15.0	35	48	56	61	81	85
APR-SEP	16.0	37	51	56	65	86	91

Forecast Pt Forecast Period	<--- Drier --- Future Conditions --- Wetter ---> Chance of Exceeding * 90% (1000AF)	70% (1000AF)	50% (Most Prob) (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)	30 Yr Avg (1000AF)
WILLOW CREEK near Harrison							
APR-JUL	1.7	6.6	10.0	56	13.4	18.3	17.7
APR-SEP	1.8	7.3	11.0	55	14.7	20	20
JEFFERSON RIVER near Three Forks							
APR-JUL	285	320	360	39	500	705	920
APR-SEP	300	340	385	38	525	735	1003

* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

(1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
(2) - The value is natural flow - actual flow may be affected by upstream water management.

JEFFERSON RIVER BASIN
Reservoir Storage (1000AF) End of March

Reservoir	Usable Capacity	********** Usable Storage ********* This Year	Last Year	Average
LIMA	84.0	6.2	14.4	36.9
CLARK CANYON	255.6	94.6	131.7	153.6
RUBY RIVER	38.8	29.7	33.3	31.2

JEFFERSON RIVER BASIN
Watershed Snowpack Analysis - April 1, 1993

Watershed	Number of Data Sites	This Year as Percent of Last Year	Average
BEAVERHEAD	16	104	85
RUBY	9	92	74
BIGHOLE	21	91	70
BOULDER	9	96	71
JEFFERSON	45	96	75

MADISON RIVER BASIN as of April 1, 1993

Snowpack conditions in the Madison River Basin dropped to below average, dropping 15 percent from March 1 but are 21 percent higher than last year. Snow water content was 89 percent of average and 121 percent of last year. Refer to the watershed snowpack analysis that follows for individual watershed percent of average and percent of last year figures.

Mountain precipitation during March was below average at 66 percent but 68 percent of last year. Water year precipitation, beginning October 1, 1992, was near average at 97 percent and 20 percent above last year.

Reservoir storage on the last day of March was 107 percent of average and 7 percent above last year. Ennis Lake storage was 89 percent of average and 1 percent below last year and Hebgen Lake storage was 110 percent of average and 8 percent above last year.

Streamflows are forecast to be below average at 85 percent and are 2 percent above those of last year. Provisional March streamflow data at the Madison River near Grayling was near average and about the same as last year and the Madison River near McAllister was near average and about 20 to 25 percent above last year.

Surface Water Supply Index (SWSI) rating for the Madison River was -0.5.

MADISON RIVER BASIN
Streamflow Forecasts - April 1, 1993

	<== Drier ==	Future Conditions	== Wetter ==>			
Forecast Pt	Chance of Exceeding *					
Forecast Period	90% (1000AF)	70% (1000AF)	50% (Most Prob) (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)	30 Yr Avg (1000AF)
MADISON RIVER near Grayling							
APR-JUL	285	320	340	89	360	395	380
APR-SEP	375	415	440	91	465	505	486
MADISON RIVER near McAllister							
APR-JUL	460	510	545	82	580	630	662
APR-SEP	600	655	690	83	725	780	831

* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

(1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
(2) - The value is natural flow - actual flow may be affected by upstream water management.

MADISON RIVER BASIN
Reservoir Storage (1000AF) End of March

Reservoir	Usable Capacity	********** Usable Storage ********* This Year	Last Year	Average
ENNIS LAKE	41.0	29.5	29.8	33.2
HEBGEN LAKE	377.5	271.2	250.7	246.6

MADISON RIVER BASIN
Watershed Snowpack Analysis - April 1, 1993

Watershed	Number of Data Sites	This Year as Percent of Last Year	Average
MADISON above HEBGEN	7	127	94
LOWER MADISON	10	117	84
MADISON	17	122	89

GALLATIN RIVER BASIN as of April 1, 1993

Snowpack conditions in the Gallatin River Basin remain below average, decreasing 7 percent from last month, but are 10 percent above last year. Snow water content was 77 percent of average and 110 percent of last year. Refer to the watershed snowpack analysis that follows for individual watershed percent of average and percent of last year figures.

Mountain precipitation during March was below average at 77 percent but 77 percent above last March. Water year precipitation, beginning October 1, 1992, remains below average at 87 percent but is 21 percent above last year.

Middle Creek storage on the last day of March was 59 percent of average and 20 percent below last year. Note: Middle Creek storage was increased by 2,200 acre-feet during the fall of 1992, therefore the percent of average is reflecting the new capacity with averages prior to the additional storage.

Streamflows are forecast to be below average at 75 percent and 5 percent above last year. Provisional March streamflow data for the Gallatin River near Gateway was near average and slightly below last year and the Gallatin River at Logan was near average and about 40 percent above last year.

Surface Water Supply Index (SWSI) rating for the Gallatin River was -2.1.

GALLATIN RIVER BASIN
Streamflow Forecasts - April 1, 1993

	<=== Drier ===		Future Conditions		=== Wetter ===>		
Forecast Pt	========== Chance of Exceeding * ==========						
Forecast Period	90% (1000AF)	70% (1000AF)	50% (Most Prob) (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)	30 Yr Avg (1000AF)
GALLATIN RIVER near Gateway							
APR-JUL	295	335	360	82	385	425	441
APR-SEP	360	400	430	83	460	500	518
E & W FK HYALITE CREEK near Bozeman							
APR-JUL	12.0	15.0	16.0	71	18.0	20	23
APR-SEP	14.0	17.0	19.0	72	20	23	26
HYALITE CREEK near Bozeman							
APR-JUL	19.0	23	26	72	29	33	36
APR-SEP	22	27	30	71	33	38	42
GALLATIN RIVER at Logan							
APR-JUL	210	290	345	69	400	480	498
APR-SEP	265	350	410	71	470	555	581

* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

(1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
(2) - The value is natural flow - actual flow may be affected by upstream water management.

GALLATIN RIVER BASIN
Reservoir Storage (1000AF) End of March

Reservoir	Usable Capacity	********** Usable Storage ********** This Year	Last Year	Average
MIDDLE CREEK	10.2	2.4	3.0	4.1

GALLATIN RIVER BASIN
Watershed Snowpack Analysis - April 1, 1993

Watershed	Number of Data Sites	This Year as Percent of Last Year	Average
UPPER GALLATIN	10	114	83
EAST GALLATIN	8	99	69
GALLATIN	15	110	77

MAINSTEM MISSOURI RIVER BASIN as of April 1, 1993

Snowpack conditions in the Mainstem Missouri River Basin remain below average, dropping 14 percent from March 1, but are 11 percent above last year. Snow water content was 71 percent of average and 111 percent of last year. Refer to the watershed snowpack analysis that follows for individual watershed percent of average and percent of last year figures.

Mountain precipitation during March was well below average at 57 percent but was 20 percent above last year. Water year precipitation, beginning October 1, 1992, remains below average at 81 percent but was 11 percent above last year.

Reservoir storage on the last day of March was 99 percent of average and 2 percent above last year. Canyon Ferry Lake storage was 99 percent of average and 2 percent above last year; Helena Valley storage was 110 percent of average and 10 percent above last year; Lake Helena storage was 105 percent of average and 2 percent below last year; Hauser & Helena storage was 102 percent of average and 1 percent below last year; Holter Lake storage was 121 percent of average and the same as last year; and Fort Peck Lake storage was 72 percent of average and 7 percent below last year.

Streamflows are forecast to be well below average at 62 percent and 14 percent below last year. Provisional March streamflow data for the Missouri River near Toston was near average and about 25 percent above last year; the Missouri River at Fort Benton was about 25 percent above average and around 75 percent above last year; and the Missouri River below Fort Peck was about 20 percent above average and more than two and a half times that of last year.

Surface Water Supply Index (SWSI) rating for the Missouri River above Canyon Ferry was -1.8; the Missouri River below Canyon Ferry was -1.5; the Missouri River above Ft. Peck was -1.6; and the Missouri River below Ft. Peck was -2.5.

MAINSTEM MISSOURI RIVER BASIN
Streamflow Forecasts - April 1, 1993

	<=== Drier ===	Future	Conditions	=== Wetter ===>		
Forecast Pt	========== Chance of Exceeding * ==========					
Forecast Period	90% (1000AF)	70% (1000AF)	50% (Most Prob) (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)	30 Yr Avg (1000AF)
MISSOURI RIVER at Toston							
APR-JUL	900	1150	1400	67	1680	2100	2075
APR-SEP	1090	1350	1640	68	1930	2190	2411
PRICKLY PEAR CREEK near Clancy							
APR-JUL	6.0	8.0	15.0	63	21	31	23
APR-SEP	8.0	10.0	17.0	64	25	36	27
SUN RIVER at Gibson Dam							
APR-JUL	196	265	310	65	355	425	478
APR-SEP	235	305	355	67	405	475	526
MISSOURI RIVER at Fort Benton							
APR-JUL	610	1320	1800	58	2280	2990	3087
APR-SEP	1300	1760	2290	62	2820	3340	3711

Forecast Pt / Forecast Period	<=== Drier === 90% (1000AF)	70% (1000AF)	Future Conditions 50% (Most Prob) (1000AF)	(% AVG.)	=== Wetter ==> 30% (1000AF)	10% (1000AF)	30 Yr Avg (1000AF)
	Chance of Exceeding *						
MARIAS RIVER near Shelby							
APR-JUL	47	134	193	43	250	340	447
APR-SEP	66	155	215	44	275	365	487
MISSOURI RIVER at Virgelle							
APR-JUL	685	1470	2000	56	2530	3320	3595
APR-SEP	1520	1850	2450	58	3050	3740	4207
MISSOURI RIVER near Landusky							
APR-JUL	865	1670	2220	57	2770	3580	3897
APR-SEP	1650	2090	2680	59	3270	4170	4580
MISSOURI RIVER below Fort Peck							
APR-JUL	990	1770	2300	57	2830	3610	4015
APR-SEP	1560	1940	2510	56	3080	3930	4467

* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

(1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
(2) - The value is natural flow - actual flow may be affected by upstream water management.

MAINSTEM MISSOURI RIVER BASIN
Reservoir Storage (1000AF) End of March

Reservoir	Usable Capacity	********** Usable Storage ********* This Year	Last Year	Average
CANYON FERRY LAKE	2043.0	1468.0	1432.0	1489.0
HELENA VALLEY	9.2	4.4	4.0	4.0
LAKE HELENA	10.4	10.7	10.9	10.2
HAUSER & HELENA	61.9	62.5	63.1	61.0
HOLTER LAKE	81.9	81.4	81.2	67.2
FORT PECK LAKE (MAF)	18.9	10.8	11.6	14.9

MAINSTEM MISSOURI RIVER BASIN
Watershed Snowpack Analysis - April 1, 1993

Watershed	Number of Data Sites	This Year as Percent of Last Year	Average
MISSOURI HEADWATERS	71	105	78
WEST SIDE MISSOURI	7	96	70
SMITH-BELT	7	126	76
MAINSTEM MISSOURI	14	112	74
SUN-TETON-MARIAS	14	100	70
JUDITH-MUSSELSHELL	13	126	73
MISSOURI above FORT PECK	104	106	76
MILK RIVER	8	121	73
MISSOURI in MONTANA	109	106	76
MISSOURI blw YELLOWSTONE	187	102	74

Snowpack conditions in the Smith-Judith-Musselshell River Basins remain below average, dropping 14 percent from March 1 but are 26 percent higher than last year. Snow water content was 73 percent of average and 126 percent of last year. Refer to the watershed snowpack analysis that follows for individual watershed percent of average and percent of last year figures.

Mountain precipitation during March was well below average at 66 percent and was 33 percent above last year. Water year precipitation, beginning October 1, 1992, remains average at 90 percent but was 23 percent above last year.

Reservoir storage on the last day of March was 121 percent of average. Smith River storage was 72 percent of average and 2 percent below last year; Bair storage was 119 percent of average and 5 percent below last year; Martinsdale storage was 74 percent of average and 9 percent below last year; and Deadman's Basin was 137 percent of average and 3 percent above last year.

Streamflows are forecast to be well below average at 64 percent and 28 percent above last year.

Surface Water Supply Index (SWSI) rating for the Smith River was -2.9 and the Musselshell River was -0.3.

SMITH-JUDITH-MUSSELSHELL RIVER BASINS
Streamflow Forecasts - April 1, 1993

	<=== Drier ===		Future Conditions		=== Wetter ===>		
Forecast Pt	Chance of Exceeding *						
Forecast Period	90% (1000AF)	70% (1000AF)	50% (Most Prob) (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)	30 Yr Avg (1000AF)
SMITH RIVER near Fort Logan							
APR-JUL	12.8	29	40	65	51	67	62
APR-SEP	22	39	51	70	63	80	73
SHEEP CREEK nr White Sulphur Springs							
APR-JUL	8.2	10.7	12.4	69	14.1	16.6	18.1
APR-SEP	11.0	13.0	15.0	72	17.0	20	21
NF MUSSELSHELL near Delpine							
APR-JUL	0.9	2.2	3.1	65	4.0	5.3	4.8
APR-SEP	1.3	2.7	3.7	66	4.7	6.1	5.6
SF MUSSELSHELL abv Martinsdale							
APR-JUL	10.0	20	32	62	44	61	52
APR-SEP	13.0	23	35	63	47	66	56

* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

(1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
(2) - The value is natural flow - actual flow may be affected by upstream water management.

SMITH-JUDITH-MUSSELSHELL RIVER BASINS
Reservoir Storage (1000AF) End of March

Reservoir	Usable Capacity	********** Usable Storage ********* This Year	Last Year	Average
SMITH RIVER	10.6	5.3	5.4	7.4
NEWLAN CREEK		NO REPORT		
BAIR	7.0	5.6	5.9	4.7
MARTINSDALE	23.1	7.2	7.9	9.7
DEADMAN'S BASIN	72.2	68.8	67.0	50.1

SMITH-JUDITH-MUSSELSHELL RIVER BASINS
Watershed Snowpack Analysis - April 1, 1993

Watershed	Number of Data Sites	This Year as Percent of Last Year	Average
SMITH-BELT	7	126	76
JUDITH-MUSSELSHELL	13	126	73

SUN-TETON-MARIAS RIVER BASINS as of April 1, 1993

Snowpack conditions in the Sun-Teton-Marias River Basins remain below average, dropping 1 percent from March 1, and 1 percent below last year. Snow water content was 70 percent of average and 99 percent of last year. Refer to the watershed snowpack analysis that follows for individual watershed percent of average and percent of last year figures.

Mountain precipitation for March was average at 93 percent and twice that of last year. Water year precipitation, beginning October 1, 1992, was below average at 78 percent and 4 percent above last year.

Reservoir storage on the last day of March was 112 percent of average and 1 percent below last year. Gibson storage was 87 percent of average and 30 percent below last year; Pishkun storage was 104 percent of average and 2 percent below last year; Willow Creek storage was 103 percent of average and 28 percent below last year; Lower Two Medicine Lake storage was 161 percent of average and 3 percent above last year; Four Horns Lake storage was 110 percent of average and 10 percent above last year; Swift storage was 84 percent of average and 15 percent below last year; Lake Frances storage was 59 percent of average and 50 percent below last year; and Lake Elwell (Tiber) storage was 121 percent of average and 9 percent above last year.

Streamflows are forecast to be well below average at 56 percent and 21 percent below last year. Provisional March streamflow data for the Sun River at Gibson Dam was near average and around 24 percent below last year and the Marias River near Shelby was around 55 percent above average and about two and a half times that of last year.

Surface Water Supply Index (SWSI) rating for the Sun River was -2.8; the Teton River was -2.6; the Marias River was -2.9; and the Birch/Dupuyer Creeks were -3.1.

SUN-TETON-MARIAS RIVER BASINS
Streamflow Forecasts - April 1, 1993

	<=== Drier ===	Future Conditions			=== Wetter ===>		
Forecast Pt	========== Chance of Exceeding * ==========						
Forecast Period	90% (1000AF)	70% (1000AF)	50% (Most Prob) (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)	30 Yr Avg (1000AF)
SUN RIVER at Gibson Dam							
APR-JUL	196	265	310	65	355	425	478
APR-SEP	235	305	355	67	405	475	526
TWO MEDICINE RIVER near Browning							
APR-JUL	60	101	129	60	157	198	215
APR-SEP	72	112	140	61	168	210	228
BADGER CREEK near Browning							
APR-JUL	31	50	63	61	76	95	104
APR-SEP	41	62	76	63	90	111	120
SWIFT RESERVOIR Inflow near Dupuyer							
APR-JUL	21	35	44	65	54	68	68
APR-SEP	31	45	55	69	65	80	80
DUPUYER CREEK near Valier							
APR-JUL	3.0	5.0	6.8	44	13.0	22	15.5
APR-SEP	5.0	7.0	9.5	55	16.2	26	17.4

Forecast Pt / Forecast Period	<=== Drier === 90% (1000AF)	70% (1000AF)	Future Conditions === Chance of Exceeding * 50% (Most Prob) (1000AF)	(% AVG.)	Wetter ===> 30% (1000AF)	10% (1000AF)	30 Yr Avg (1000AF)
CUT BANK CREEK at Cut Bank							
APR-JUL	30	44	53	61	62	76	87
APR-SEP	35	49	59	61	69	83	96
MARIAS RIVER near Shelby							
APR-JUL	47	134	193	43	250	340	447
APR-SEP	66	155	215	44	275	365	487

* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

(1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
(2) - The value is natural flow - actual flow may be affected by upstream water management.

SUN-TETON-MARIAS RIVER BASINS
Reservoir Storage (1000AF) End of March

Reservoir	Usable Capacity	********* Usable Storage ********* This Year	Last Year	Average
GIBSON	99.1	44.0	62.7	50.5
PISHKUN	32.0	18.5	18.8	17.8
WILLOW CREEK	32.2	23.4	30.0	22.8
LOWER TWO MEDICINE LAKE	11.9	12.1	11.7	7.5
FOUR HORNS LAKE	19.2	13.7	12.5	12.5
SWIFT	30.0	14.5	17.1	17.2
LAKE FRANCES	112.0	42.4	85.2	71.6
LAKE ELWELL (TIBER)	1347.0	722.3	662.7	596.7

SUN-TETON-MARIAS RIVER BASINS
Watershed Snowpack Analysis - April 1, 1993

Watershed	Number of Data Sites	This Year as Percent of Last Year	Average
SUN-TETON	9	101	71
MARIAS	6	97	69
SUN-TETON-MARIAS	14	100	70

ST. MARY and MILK RIVER BASINS as of April 1, 1993

Snowpack conditions in the St. Mary and Milk River Basins are below average, dropping 11 percent from March 1, but are 7 percent above last year. Snow water content was 65 percent of average and 107 percent of last year. Refer to the watershed snowpack analysis that follows for individual watershed percent of average and percent of last year figures.

Mountain precipitation for March was near average at 96 percent and nearly two and a half times above last year. Water year precipitation, beginning October 1, 1992, was below average at 82 percent and is 6 percent above last year.

Reservoir storage on the last day of March was 91 percent of average and 4 percent below last year. Lake Sherburne storage was 119 percent of average and 300 percent above last year; Fresno storage was 90 percent of average and 17 percent below last year; Beaver Creek storage was 155 percent of average and 3 percent above last year; and Nelson storage was 70 percent of average and 28 percent below last year.

Streamflows are forecast to be below average at 70 percent and 12 percent below last year.

Surface Water Supply Index (SWSI) rating for the Milk River (USBR) users was -2.7 and the Milk River (other users) was -3.1.

ST. MARY and MILK RIVER BASINS
Streamflow Forecasts - April 1, 1993

	<=== Drier ===		Future Conditions		=== Wetter ===>		
Forecast Pt	Chance of Exceeding *						
Forecast Period	90% (1000AF)	70% (1000AF)	50% (Most Prob) (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)	30 Yr Avg (1000AF)
SWIFTCURRENT CREEK at Sherburne							
APR-JUL	56	65	71	66	77	86	107
APR-SEP	71	81	87	70	93	103	125
ST. MARY RIVER near Babb							
APR-JUL	225	250	270	68	290	315	395
APR-SEP	275	310	335	72	360	395	463
MILK RIVER at Eastern Crossing							
APR-SEP	135	161	185	79	215	245	233
MILK RIVER at Eastern Crossing (2)							
APR-SEP	29	33	37	57	47	57	65

* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

(1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
(2) - The value is natural flow - actual flow may be affected by upstream water management.

ST. MARY and MILK RIVER BASINS
Reservoir Storage (1000AF) End of March

Reservoir	Usable Capacity	********** Usable Storage ********* This Year	Last Year	Average
LAKE SHERBURNE	64.3	29.4	9.8	24.8
FRESNO	127.0	69.6	83.9	77.1
BEAVER CREEK	3.5	3.4	3.3	2.2
NELSON	66.8	25.6	35.6	36.5

ST. MARY and MILK RIVER BASINS
Watershed Snowpack Analysis - April 1, 1993

Watershed	Number of Data Sites	This Year as Percent of Last Year	Average
MILK HEADWATERS	3	109	73
BEAR PAW	5	207	75
MILK RIVER	8	121	73
ST. MARY	5	100	66
ST. MARY and MILK	10	107	67
BOW RIVER in ALBERTA	22	77	61
OLDMAN RIVER in ALBERTA	6	111	73

UPPER YELLOWSTONE RIVER BASIN as of April 1, 1993

Snowpack conditions in the Upper Yellowstone River Basin remain below average, dropping 8 percent from March 1, and are the same as last year. Snow water content was 69 percent of average and 100 percent of last year. Refer to the watershed snowpack analysis that follows for individual watershed percent of average and percent of last year figures.

Mountain precipitation for March was below average at 76 percent and was 48 percent above last year. Water year precipitation, beginning October 1, 1992, was below average at 80 percent which was 6 percent above last year.

Reservoir storage on the last day of March was 107 percent of average and 1 percent below last year. Mystic Lake storage was 32 percent of average and 25 percent above last year and Cooney storage was 120 percent of average and 4 percent below last year.

Streamflows are forecast to be below average at 76 percent and 1 percent above last year. Provisional March streamflow data for the Yellowstone River at Corwin was about 80 percent of average and about 25 percent below last year; the Boulder River at Big Timber was about average and around 10 to 15 percent above last year; West Rosebud Creek near Roscoe was about 60 percent of average and around 30 to 35 percent last year; the Stillwater near Absarokee was about 80 percent of average and around 15 percent below last year; the Clark's Fork River near Belfry was around 140 percent of average and around 15 percent above last year; and the Yellowstone River near Billings was around 70 percent of average and near that of last year.

Surface Water Supply Index (SWSI) rating for the Yellowstone River above Bighorn River was -2.8; the Yellowstone River above Livingston was -2.7; the Shields River was -2.4; the Boulder River was -3.3; the Stillwater River was -3.3; the Rock/Red Lodge Creeks were -2.8; and the Clarks Fork River was -2.6.

UPPER YELLOWSTONE RIVER BASIN
Streamflow Forecasts - April 1, 1993

	<=== Drier ===	Future	Conditions	=== Wetter ===>		
Forecast Pt	========== Chance of Exceeding * ==========					
Forecast Period	90% (1000AF)	70% (1000AF)	50% (Most Prob) (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)	30 Yr Avg (1000AF)
YELLOWSTONE RIVER at Corwin Springs							
APR-JUL	1110	1210	1270	79	1330	1430	1609
APR-SEP	1350	1470	1560	81	1650	1770	1937
YELLOWSTONE RIVER near Livingston							
APR-JUL	1250	1370	1450	78	1530	1650	1855
APR-SEP	1560	1700	1800	80	1900	2040	2241
SHIELDS RIVER near Livingston							
APR-JUL	67	93	110	68	127	153	162
APR-SEP	83	108	126	70	144	170	179
BOULDER RIVER at Big Timber							
APR-JUL	156	197	225	67	255	295	335
APR-SEP	175	215	245	67	275	315	364
WEST ROSEBUD CREEK near Roscoe							
APR-JUL	30	36	40	66	44	50	61
APR-SEP	41	48	53	67	58	65	79

Forecast Pt Forecast Period	<=== Drier === 90% (1000AF)	70% (1000AF)	Future Conditions 50% (Most Prob) (1000AF)	(% AVG.)	=== Wetter ===> 30% (1000AF)	10% (1000AF)	30 Yr Avg (1000AF)
			Chance of Exceeding *				
STILLWATER RIVER nr Absarokee							
APR-JUL	210	280	325	65	370	440	498
APR-SEP	265	330	375	63	420	485	593
CLARKS FORK RIVER near Belfry							
APR-JUL	290	345	380	71	415	470	532
APR-SEP	310	370	410	69	450	510	590
RED LODGE CREEK blw Cooney Res							
APR-JUL	3.0	18.0	29	62	40	55	47
APR-SEP	10.0	26	36	63	47	62	57
YELLOWSTONE RIVER at Billings							
APR-JUL	2010	2450	2750	77	3050	3490	3577
APR-SEP	2740	3030	3300	78	3580	3870	4211

* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

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(2) - The value is natural flow - actual flow may be affected by upstream water management.

UPPER YELLOWSTONE RIVER BASIN
Reservoir Storage (1000AF) End of March

Reservoir	Usable Capacity	********** Usable Storage ********* This Year	Last Year	Average
MYSTIC LAKE	21.0	1.0	0.5	3.1
COONEY	27.4	20.3	21.1	16.9

UPPER YELLOWSTONE RIVER BASIN
Watershed Snowpack Analysis - April 1, 1993

Watershed	Number of Data Sites	This Year as Percent of Last Year	Average
YELLOWSTONE ab LIVINGSTON	18	110	75
SHIELDS	7	105	70
BOULDER-STILLWATER	7	93	64
CLARK'S FORK-ROCK CREEK	13	87	65
UPPER YELLOWSTONE above BIGH	41	100	69

LOWER YELLOWSTONE RIVER BASIN as of April 1, 1993

Snowpack conditions in the Lower Yellowstone River Basin remain below average, dropping 2 percent from March 1, and are 4 percent below last year. Snow water content was 73 percent of average and 96 percent of last year. Refer to the watershed snowpack analysis that follows for individual watershed percent of average and percent of last year figures.

Mountain precipitation for March was below average at 70 percent and was 20 percent below last year. Water year precipitation, beginning October 1, 1992, remains below average at 81 percent and was 5 percent below last year.

Reservoir storage on the last day of March was 100 percent of average. Bighorn Lake storage was 102 percent of average and 1 percent below last year and Tongue River was 46 percent.

Streamflows are forecast to be below average at 73 percent and 1 percent below last year. Provisional March streamflow data for the Bighorn River near Saint Xavier was near average and around 10 to 15 percent above last year.

Surface Water Supply Index (SWSI) rating for the Yellowstone River below Bighorn River was -1.2; the Bighorn River below Bighorn Lake was -0.7; the Little Bighorn River was --2.6; the Tongue River was -3.1; and the Powder River was -3.4.

LOWER YELLOWSTONE RIVER BASIN
Streamflow Forecasts - April 1, 1993

	<--- Drier ---	Future Conditions	--- Wetter --->			
Forecast Pt	Chance of Exceeding *					
Forecast Period	90% (1000AF)	70% (1000AF)	50% (Most Prob) (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)	30 Yr Avg (1000AF)
YELLOWSTONE RIVER at Billings							
APR-JUL	2010	2450	2750	77	3050	3490	3577
APR-SEP	2740	3030	3300	78	3580	3870	4211
BIGHORN RIVER nr St. Xavier (2)							
APR-JUL	490	875	1140	69	1400	1790	1645
APR-SEP	665	930	1210	67	1490	1780	1794
LITTLE BIGHORN RIVER nr Hardin							
APR-JUL	3.0	55	90	64	125	177	140
APR-SEP	19.0	62	100	64	138	205	157
TONGUE RIVER near Decker (2)							
APR-JUL	74	114	162	71	210	280	227
APR-SEP	71	129	180	74	230	305	244
YELLOWSTONE at Miles City (2)							
APR-JUL	2350	3350	4030	74	4710	5710	5431
APR-SEP	3330	3880	4620	74	5360	5970	6281
POWDER RIVER at Moorhead							
APR-JUL	51	89	131	62	192	280	211
APR-SEP	46	102	145	66	205	290	221

Forecast Pt Forecast Period	<=== Drier === Future Conditions === Wetter ===> Chance of Exceeding * 90% (1000AF)	70% (1000AF)	50% (Most Prob) (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)	30 Yr Avg (1000AF)
POWDER RIVER near Locate							
APR-JUL	76	109	159	63	230	340	252
APR-SEP	50	120	176	64	250	365	276
YELLOWSTONE RIVER nr Sidney (2) (from YB							
APR-JUL			4100	72			5695
APR-SEP			4930	72			6814

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(2) - The value is natural flow - actual flow may be affected by upstream water management.

LOWER YELLOWSTONE RIVER BASIN
Reservoir Storage (1000AF) End of March

Reservoir	Usable Capacity	********** Usable Storage ********* This Year	Last Year	Average
BIGHORN LAKE	1356.0	814.8	820.5	798.5
TONGUE RIVER	68.0	16.7	17.3	36.1

LOWER YELLOWSTONE RIVER BASIN
Watershed Snowpack Analysis - April 1, 1993

Watershed	Number of Data Sites	This Year as Percent of Last Year	Average
WIND RIVER (Wyoming)	17	113	81
BIGHORN RIVER (Wyoming)	21	90	71
LITTLE BIGHORN	3	97	72
TONGUE RIVER (Wyoming)	10	91	72
POWDER RIVER (Wyoming)	9	71	69
YELLOWSTONE RIVER	85	97	71

Basin Outlook Reports
and
Federal - State - Private
Cooperative Snow Surveys

For more water supply and resource management information, contact:

See attached list.

How forecasts are made

Most of the annual streamflow in the Western United States originates as snowfall that has accumulated high in the mountains during winter and early spring. As the snowpack accumulates, hydrologists estimate the runoff that will occur when it melts. Predictions are based on careful measurements of snow water equivalent at selected index points. Precipitation, temperature, soil moisture and antecedent streamflow data are combined with snowpack data to prepare runoff forecasts. Streamflow forecasts are coordinated by Soil Conservation Service and National Weather Service hydrologists. This report presents a comprehensive picture of water supply conditions for areas dependent upon surface runoff. It includes selected streamflow forecasts, summarized snowpack and precipitation data, reservoir storage data, and narratives describing current conditions.

Snowpack data are obtained by using a combination of manual and automated SNOTEL measurement methods. Manual readings of snow depth and water equivalent are taken at locations called snow courses on a monthly or semi-monthly schedule during the winter. In addition, snow water equivalent, precipitation and temperature are monitored on a daily basis and transmitted via meteor burst telemetry to central data collection facilities. Both monthly and daily data are used to project snowmelt runoff.

Forecast uncertainty originates from two sources: (1) uncertainty of future hydrologic and climatic conditions, and (2) error in the forecasting procedure. To express the uncertainty in the most probable forecast, four additional forecasts are provided. The actual streamflow can be expected to exceed the most probable forecast 50% of the time. Similarly, the actual streamflow volume can be expected to exceed the 90% forecast volume 90% of the time. The same is true for the 70%, 30%, and 10% forecasts. Generally, the 90% and 70% forecasts reflect drier than normal hydrologic and climatic conditions; the 30% and 10% forecasts reflect wetter than normal conditions. As the forecast season progresses, a greater portion of the future hydrologic and climatic uncertainty will become known and the additional forecasts will move closer to the most probable forecast.

All programs and services of the USDA Soil Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

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Soil Conservation Service
Bozeman, Montana

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Montana
Basin Outlook Report

Soil Conservation Service
Bozeman, MT

SOIL CONSERVATION SERVICE